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MINERALOGICAL NOTES: No. VI.—TOPAZ, BERYL, ANGLESITE, RUTILE, ATACAMITE, PYRITE.

By C. Anderson, M.A., B.Sc., Mineralogist.

(Plates xiii.-xvi.).

TOPAZ

Cow Flat, near Torrington, New South Wales

(Plate xiii., figs. 1, 2.)

Two specimens from this locality were examined and measured. Fig. 1 represents a crystal from the collection of the Department of Mines; it occurs *in situ* in a small vugh, accompanied by crystallised quartz and three smaller topaz crystals, at Fielder's Hill. The habit is stout prismatic, the dimensions 12 × 12 × 12 mm., and the colour pale blue. For measurement the entire specimen was mounted on the two-circle goniometer with the face m''' $(1\bar{1}0)$ polar, the forms being determined from the stereographic projection by aid of Penfield's protractors. The base is quite rough; *f* and *y* slightly inter-oscillate.

The other specimen (Plate xiii., fig. 2) consists of an isolated, transparent, colourless crystal of 2·7 × 2·2 × 1·6 cm. The basal plane and the dome *f* are roughened by oscillation with *y* and *h*. The prism faces are as usual striated vertically, and some of them yield multiple images; *n* (140) is doubtfully present.

The measured and calculated co-ordinate angles are tabulated below; Dana's ratios and lettering are used throughout.

Forms.		Measured.		Calculated.		Difference.	
		φ	ρ	φ	ρ	φ	ρ
		° ′	° ′	° ′	° ′	° ′	° ′
c	001	—	—	—	—	—	—
b	010	0 2	90 3	0 0	90 0	0 2	0 3
m	110	62 11	89 59	62 8	,,	0 3	0 1
M	230	51 55	89 57	51 35	,,	0 20	0 3
l	120	43 25	90 0	43 25	,,	0 0	0 0
g	130	31 58	89 59	32 14	,,	0 16	0 1
n (?)	140	23 33	89 55	25 19	,,	1 46	0 5
d	201	90 14	60 56	90 0	61 0	0 14	0 4
h	203	90 10	29 53	,,	31 2	0 10	1 9
f	021	0 1	43 37	0 0	43 39	0 1	0 2
y	041	0 1	62 20	,,	62 20	0 1	0 0
o	221	62 13	63 53	62 8	63 54	0 5	0 1
u	111	62 13	45 35	,,	45 35	0 5	0 0
i	223	62 6	34 14	,,	34 14	0 2	0 0

Stanthorpe, Queensland.

(Plate xiii., figs. 3, 4.)

At Stanthorpe, topaz is usually found as waterworn pebbles without crystalline facets, but in the collection of the National Museum, Melbourne, is a fine crystal which was kindly lent for description and is here figured. The specimen, which measures 3·1 x 3 x 2·3 cm., is of a beautiful deep blue colour, and is well and symmetrically developed. The large *d* faces are striated parallel to their intersection with *o*; the dome *f* shows markings with a general direction parallel to the plane of the *c* and *b* axes; the lower end is truncated by the basal cleavage. The crystal has a striking resemblance to the large waterworn crystals obtained at Oban, New South Wales.[1]

Pakenham, Victoria.

(Plate xiii., figs. 5-7.)

Some small crystals, obtained on loan from the National Museum, Melbourne, are of considerable interest. A crystal of about 4 mm. in greatest diameter is represented in Fig. 5; the

[1] Anderson—Rec. Austr. Mus., vi., 2, 1905, p. 85, pl. xviii., fig. 2.

faces are for the most part smooth and bright, but the prism faces are strongly striated vertically and sometimes give multiple images.

Angles:—

Forms.		Measured.		Calculated.		Difference.	
		ϕ	ρ	ϕ	ρ	ϕ	ρ
		° ′	° ′	° ′	° ′	° ′	° ′
c	001	—	—	—	—	—	—
b	010	0 0	90 1	0 0	90 0	0 0	0 1
m	110	62 3	90 1	62 8	”	0 5	0 1
M	230	51 30	90 2	51 35	”	0 5	0 2
l	120	43 26	90 0	43 25	”	0 1	0 0
g	130	33 56	90 0	32 14	”	1 42	0 0
n	140	25 35	90 4	25 19	”	0 16	0 4
d	201	89 52	61 3	90 0	61 0	0 8	0 3
f	021	0 5	43 36	0 0	43 39	0 5	0 3
y	041	0 0	62 18	”	62 20	0 0	0 2
o	221	62 5	63 58	62 8	63 54	0 3	0 4
u	111	62 8	45 36	”	45 35	0 0	0 1
i	223	62 12	34 11	”	34 14	0 4	0 3

The other figured crystal is a fragment of 1 × ·7 × ·4 cm., but it has what seems to be a new macrodome *j* (501) as a fairly large but somewhat rough (apparently etched) face, yielding only a patch of light in the telescope. It may possibly be an accidental plane, caused by contact with a neighbouring crystal, but, if so, it would be unlikely to fall in a zone as the measurement indicates.

Measured.		Calculated.	
ϕ	ρ	ϕ	ρ
89° 35′	77°	90°	77° 30′

The presence of the rare prism *U* is indicated by a very narrow plane which, however, was measured in maximum illumination.

BERYL.

Torrington, New South Wales.

(Plate xvi., figs. 1, 2.)

Some fine large prisms of beryl have recently been discovered near Torrington. They occur attached to crystals of quartz, which with masses of wolfram are found in a matrix of clay at Heffernan's Lease. The specimens were donated by Mr. Charles Bogenrieder, mining engineer, from whom particulars of the occurrence were obtained. Individual crystals measure up to 6 cm. in horizontal diameter by 5 cm. vertically; the prisms are striated vertically and invariably broken across. The crystals are very simple, usually showing only the base and a hexagonal prism with an occasional face of a second prism.

The Gulf, near Emmaville, New South Wales.

(Plate xvi., figs. 4-8.)

Here beryl occurs embedded in, or associated with, quartz; the habit is long prismatic; terminated simply by *c* (0001); colour pale bluish-green. Broken crystals measure up to $5 \cdot 5 \times 2$ cm.

ANGLESITE.

Broken Hill, New South Wales.

(Plate xiv.; Plate xv., fig. 1; Plate xvi, fig. 3.)

Mr. P. T. Hammond[2] in 1895 figured some crystals of anglesite from the Consols Mine; in the present paper anglesite from the Central, Block 14, and Proprietary Mines are described. From the Central nine crystals were measured, and two each from Block 14 and the Proprietary; for any one mine the habit is fairly constant and the combinations similar.

(1) From the Central come as a rule small crystals of about 2 to 3 mm. in diameter, which are seated on reticulated cerussite; sometimes the latter projects as long slender prisms or thin plates amongst the anglesite, and, now and then, a minute, perfectly formed anglesite crystal is poised on the tip of a slender rod of cerussite. The crystals are transparent and colourless to opaque white, or sometimes have a slight yellowish tinge.

Thirteen forms were determined, of which three are new; in addition *O* is doubtfully present, and approximate measurements were obtained of what are most likely vicinal faces not deserving of crystallographic symbols. The new forms *Y* (187), *X* (3·4·12), and *v* (598) give by no means satisfactory measurements, as the faces are either small or wavy and the signals distorted, hence the

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[2] Hammond—Rec. Geol. Surv. N. S. Wales, iv., 4, 1895, p. 163.

angles vary between rather wide limits, and it is desirable that the forms be confirmed before they are finally accepted.

New forms :—

Forms.		Measured.		Calculated.		Limits.		No. of faces.
		φ	ρ	φ	ρ	φ	ρ	
		° ′	° ′	° ′	° ′	° ′ ° ′	° ′ ° ′	
Y	187	9 7	56 19	9 3	56 10	5 37 to 14 34	54 11 to 58 58	9
X	3·4·12	43 28	30 31	43 41	30 43	42 41 to 44 41	29 53 to 31 22	4
v	598	35 16	60 26	35 17	60 38	34 16 to 36 41	59 10 to 62 36	16

Y and *v* form narrow planes between *m* and *o*, and *m* and *y* respectively; *X* is sometimes a fairly large face, but it does not give a sharp image. The general habit of the crystals is sufficiently indicated in Plate xiv., figs. 1-3.

Angles :—

Forms.		Measured.		Calculated.		Difference.	
		φ	ρ	φ	ρ	φ	ρ
		° ′	° ′	° ′	° ′	′	′
c	001	—	—	—	—	—	—
a	100	90 0	89 58	90 0	90 0	0	2
O	520	73 25	—	72 34	,,	51	—
m	110	51 54	89 59	51 51	,,	3	1
o	011	0 0	52 10	0 0	52 12	0	2
l	104	89 59	22 20	90 0	22 19	1	1
d	102	89 59	39 20	,,	39 23	1	3
g	113	51 50	34 13	51 51	34 50	1	37
z	111	51 51	64 17	,,	64 24	0	7
y	122	32 29	56 46	32 29	56 48	0	2
μ	124	32 35	37 4	,,	37 23	6	19

(2) The characteristic habit of Block 14 anglesite is shown in Plate xiv., fig. 4; the crystals are shortened vertically, and the prism zone may be entirely wanting as in one measured crystal which is a combination of *d*, *l*, *o*, *y* simply, forming a flattened plate. The crystals, which are associated with galena and

cerussite [twinned on r (130)], attain a fair size, $2 \times 2 \times {\cdot}8$ cm., and are yellowish with a pronounced adamantine lustre. The crystal drawn is $5 \times 2{\cdot}5 \times 1$ mm.

Angles :—

Forms.		Measured.		Calculated.		Difference.	
		ϕ	ρ	ϕ	ρ	ϕ	ρ
		° ′	° ′	° ′	° ′	′	′
c	001	—	—	—	—	—	—
a	100	89 58	89 51	90 0	90 0	2	9
m	110	51 56	89 57	51 51	90 0	5	3
o	011	0 0	52 2	0 0	52 12	0	10
l	104	90 6	22 13	90 0	22 19	6	6
d	102	90 12	39 24	,,	39 23	12	1
y	122	32 37	56 41	32 29	56 48	8	7

(3) The Proprietary Mine furnishes very fine anglesite specimens, individual crystals sometimes reaching a size of $2{\cdot}5 \times 2 \times 1{\cdot}3$ cm., and the crystalline development and symmetry are excellent. Plate xvi., fig. 3, is a photograph, natural size, of a beautiful group of crystals; the drawing (Plate xiv., fig. 5) illustrates the crystal habit. Here the faces v and Y are comparatively large but much corroded, and v oscillates with z.

Angles :—

Forms.		Measured.		Calculated.		Difference.	
		ϕ	ρ	ϕ	ρ	ϕ	ρ
		° ′	° ′	° ′	° ′	′	′
c	001	—	—	—	—	—	—
a	100	90 5	89 53	90 0	90 0	5	7
m	110	51 45	89 59	51 51	90 0	6	1
o	011	0 4	52 0	0 0	52 12	4	12
l	104	90 8	22 20	90 0	22 19	8	1
d	102	90 3	39 18	,,	39 23	3	5
z	111	51 42	64 38	51 51	64 24	9	14
y	122	32 31	56 41	32 29	56 48	2	7
μ	124	32 26	37 14	,,	37 23	3	9

RUTILE.

Victor Harbour, South Australia.

(Plate xv., fig. 2.)

For the opportunity to figure these I am indebted to the Director of the National Museum, Melbourne, who courteously lent some crystals for study. The mineral occurs in felspar and in quartz.[3] Crystals are comparatively simple, the forms being *a*, *m*, *k* (?), *e* and *s*. Twinning on the common law *e* is frequent, and the figure represents a crystal in which this law is combined with the rarer twin law *v* (301); I. in the conventional position (as measured) is twinned to II. on *e*, and to III. on *v*.

Angles:—

Forms.		Measured.		Calculated.		Difference.	
		ϕ	ρ	ϕ	ρ	ϕ	ρ
		° ′	° ′	° ′	° ′	′	′
a	100	0 0	90 0	0 0	90 0	0	0
m	110	45 3	90 2	45 0	,,	3	2
e	011	0 9	32 47	0 0	32 47	9	0
s	111	45 0	42 20	45 0	42 19	0	1
a_2	$0\bar{1}0$	0 3	24 12	0 0	23 39	3	33
e_2	$0\bar{1}1$	0 8	81 21	0 0	80 52	8	29
e_3	101	38 28	60 31	38 16	60 58	12	27

Mount Gambier, South Australia.

(Plate xv., fig. 3.)

A small collection of crystals in the Mining and Geological Museum, Sydney, was examined, and one typical crystal of 7 × 3·5 mm. measured.

[3] Brown—Cat. S. Australian Minerals, p. 27, Adelaide, 1893.

Angles :—

Forms.		Measured.		Calculated.		Difference.	
		ϕ	ρ	ϕ	ρ	ϕ	ρ
		° ′	° ′	° ′	° ′	′	′
a	100	0 7	89 59	0 0	90 0	7	1
m	110	45 0	89 59	45 0	,,	0	1
k	340	36 50	90 0	36 52	,,	2	0
e	011	0 5	32 47	0 0	32 47	5	0
s	111	45 3	42 16	45 0	42 19	3	3

ATACAMITE.

Dugald R., Cloncurry, Queensland.

(Plate xv., fig. 4.)

A single specimen consisting of a large number of small, green, transparent crystals about 1·5 mm. in length, associated with massive cuprite is in our collection. Two crystals were measured, and yielded the forms enumerated below; in addition *k* (130) and *l* (230) are doubtfully present. Because of the striated nature of the prism faces accurate centering is difficult and the measurements are not good.

Angles :—

Forms.		Measured.		Calculated.		Difference.	
		ϕ	ρ	ϕ	ρ	ϕ	ρ
		° ′	° ′	° ′	° ′	° ′	′
b	010	0 10	89 48	0 0	90 0	0 10	12
m	110	56 12	89 57	56 31	,,	0 19	3
s	120	39 46	89 43	37 5	,,	2 41	17
e	011	0 19	37 19	0 0	36 55	0 19	24
n	121	40 36	62 28	37 5	62 2	3 31	26

PYRITE.

United Miners' Mine, Major's Creek, New South Wales.

(Plate xv., fig. 5.)

Splendid cubes of pyrite measuring up to 4 cm. along the edge are found at the United Miners' Mine, embedded in dolomitic calcite.[4] The cube corners are modified by small faces of *n* (211), *o* (111), *p* (221).

Angles obtained from two crystals:—

Forms.		Measured.		Calculated.		Difference.	
		ϕ	ρ	ϕ	ρ	ϕ	ρ
		° ′	° ′	° ′	° ′	′	′
a	010	0 6	90 3	0 0	90 0	6	3
n	121	26 33	65 51	26 34	65 54	1	3
	112	44 36	35 14	45 0	35 16	24	2
o	111	44 41	54 24	,,	54 44	19	20
p	221	44 14	70 11	,,	70 31	46	20
	122	27 24	47 48	26 34	48 11	50	23

[4] Card—Rec. Geol. Surv. N.S. Wales, viii., 2, 1905, p. 156.

EXPLANATION OF PLATE XIII.

TOPAZ.

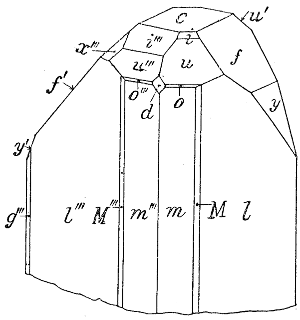
Fig. 1, 2. Cow Flat, near Torrington, N. S. Wales.

,, 3, 4. Stanthorpe, Queensland. Inorthographic and clinographic projection.

,, 5. Pakenham, Victoria.

,, 6, 7. Pakenham, Victoria. Inorthographic and clinographic projection.

Forms.—*c* (001), *b* (010); *m* (110), *M* (230), *l* (120), *g* (130), *n* (140), *U* (160); *j* (501), *d* (201), *h* (203), *f* (021), *y* (041); *o* (221), *u* (111), *i* (223), *x* (243).



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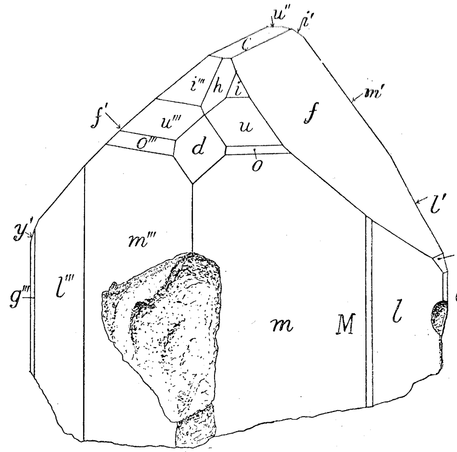

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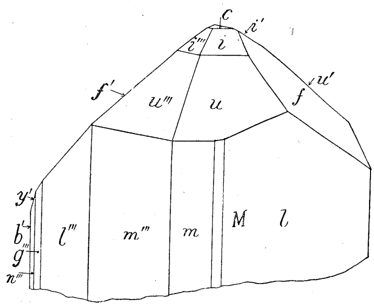

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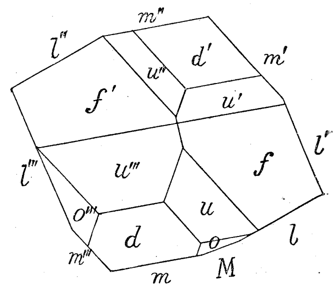

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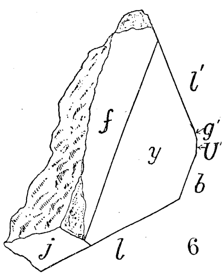

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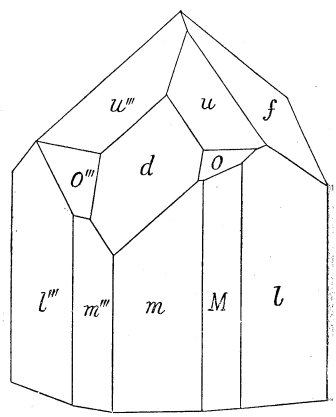

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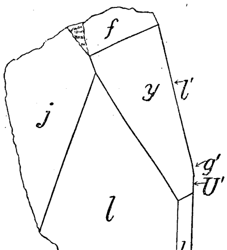

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Austr. Mus.

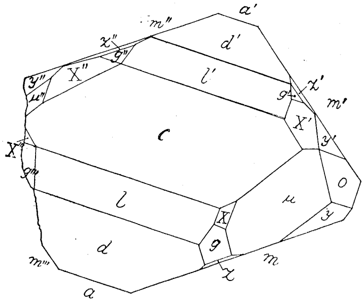
EXPLANATION OF PLATE XIV.

ANGLESITE.

Broken Hill, N. S. Wales.

Fig. 1, 2. Central Mine. Inorthographic and clinographic projection.
,, 3. Central Mine.
,, 4. Block 14 Mine.
,, 5. Proprietary Mine.

Forms.—*c* (001), *a* (100); *m* (110); *o* (011), *l* (104), *d* (102); *z* (111), *g* (113), *y* (122), *μ* (121), *Y* (187), *v* (598), *X* (3·4·12).



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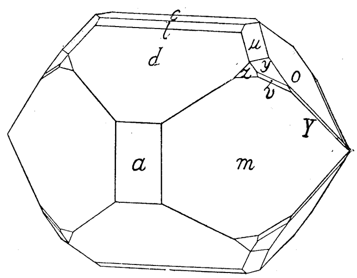

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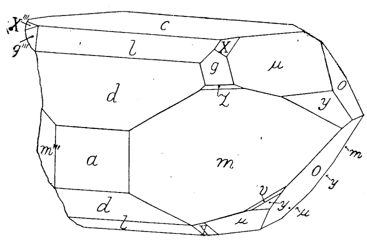

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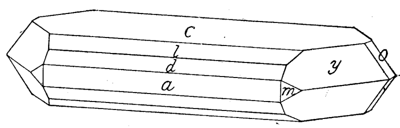

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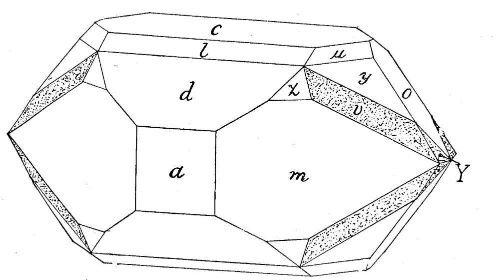

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EXPLANATION OF PLATE XV.

Anglesite.

Fig. 1. Broken Hill, N. S. Wales. Stereogram.

(For indices see Explanation of Plate XIV.).

Rutile.

Fig. 2. Victor Harbour, S. Australia. Twinned on *e* (101) and on *v* (301).
,, 3. Mt. Gambier, S. Australia.

Forms.—*a* (100), *m* (110), *k* (430), *e* (101), *s* (111).

Atacamite.

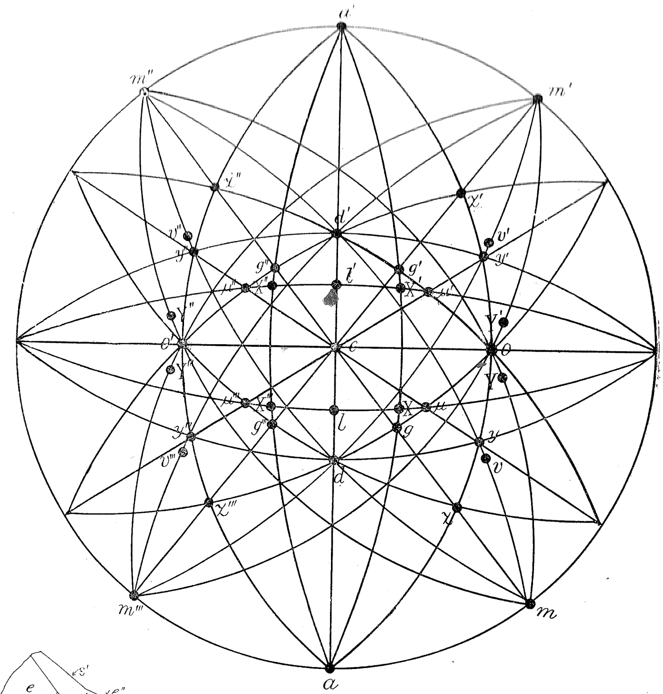
Fig. 4. Cloncurry, Queensland.

Forms.—*b* (010), *m* (110), *s* (120), *e* (011), *n* (121).

Pyrite.

Fig. 5. Major's Creek, Braidwood, N. S. Wales. (010 to front).

Forms.—*a* (100), *o* (111), *p* (221), *n* (211).



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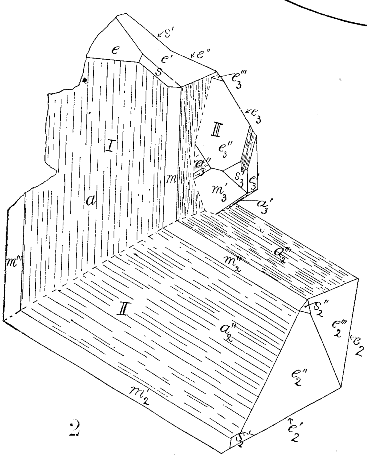

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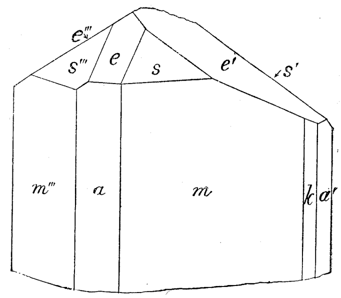

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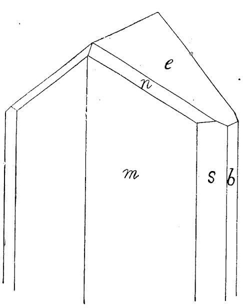

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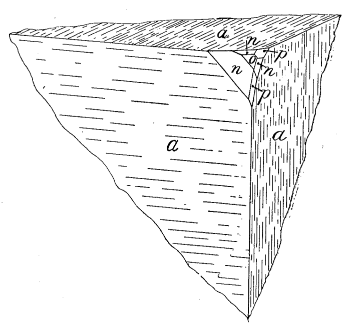

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EXPLANATION OF PLATE XVI.

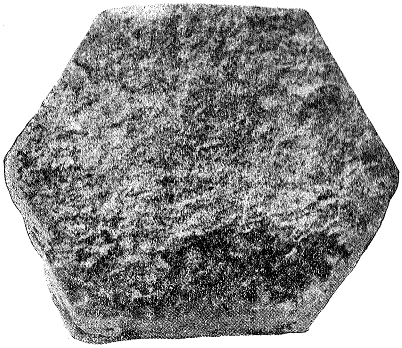
BERYL.

Fig. 1, 2. Heffernans' Lease, Torrington, N. S. Wales.
,, 4-8. The Gulf, near Emmaville, N. S. Wales.

ANGLESITE.

Fig. 3. Proprietary Mine, Broken Hill, N. S. Wales.

(All natural size).



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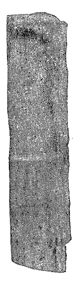

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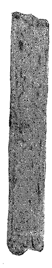

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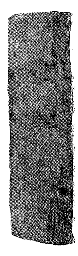

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H. BARNES, Junr., photo.,
Austr. Mus.

[The following corrections were published in the Table of Contents for Volume 7 in February, 1910—Sub-Editor, September, 2009]

CORRECTIONS.

Page 132, line 11—add "*C.*"

,, ,, line 22—delete "*u.*"

,, 213, line 5—for "*bullocki*" read "*bullockii.*"

,, 214, line 4—for "*æmulæ*" read "*æmula.*"

,, 215, line 13 from the bottom—for "silk on *stabilimentum*" read "silk or *stabilimentum.*"

,, 221, line 22—for "Belle View Hill" read "Belle Vue Hill."

,, 262—*Chiton torri*, Hedley and Hull. As this name is preoccupied by Mr. H. Suter (Proc. Malac. Roc., vii., 1907, p. 295) for a New Zealand species, the Australian shell may be known as *Chiton torriana*, Hedley and Hull.

,, 270, line 4—for "avicircularia" read "avicularia."

,, 285, line 3—for *Bothriembyron gunni*" read "*Bothriembryon gunnii.*"

,, 285, line 8—for "*Bulinus gunnii*" read "*Bulimus gunnii.*"

,, 285, line 14—after "Mt. Farrell" insert "Family Helicidæ,"

,, 330, under heading No. 5, line 3—after "Adelaide" insert "Johnston."

,, 331, line 1—omit "8."

,, ,, line 8—for "9" read "8."

,, ,, line 12—for "10" read "9."

,, 335, line 11—for "Australia" read "Australian human."

,, 336, under heading 23, line 2—omit the comma after "which."

Plate xiii., explanation—lines 3 and 5 for "Inorthographic" read "Orthographic."

,, l., explanation—for "Amboipo" read "Amboiba."

,, li., explanation—for "Amboida" read "Amboiba."

,, liii., explanation—for "Amboida" read "Amboiba."

,, lxiii., explanation—for "*Gasteracantya*" read "*Gasteracantha.*"

,, lxxii., explanation—for "fig. 28" read "fig. 23."

,, lxxxi.—transpose 2 and 3.